Agenda Item No. 9

Meeting of the Central Valley Flood Protection Board
March 21, 2008

Board Staff Report
West Sacramento Area Flood Control Agency
Application No. 18313

Board Action

Consider sending a letter requesting Section 408 approval to the U.S. Army Corps of Engineers to alter the federal flood control project levee on the west (right) bank of Sacramento River in the City of West Sacramento in Yolo County by constructing 475 feet of slurry cutoff wall and flattening approximately 50 feet of the landward side of the levee slope to 3H:1V.

Applicant

West Sacramento Area Flood Control Agency.

Location

The proposed project is located along the right (west) bank of the Sacramento River levee in West Sacramento, extending approximately 500 feet south of the I Street Bridge, in Yolo County. (See Exhibits 1 and 2, Project Vicinity and Location Maps). This reach of the levee is maintained by the Department of Water Resources, Maintenance Area No. 4.

Description

WSAFCA is proposing to construct a 475-ft long and 40-ft deep slurry wall in the west (right) bank levee of the Sacramento River, from the I Street Bridge southward. A 50-ft section of the landward levee slope at the southernmost section of the repaired section would also be flattened to bring the slope to 3 horizontal:1 vertical (See Exhibit 3).

Background

The West Sacramento Flood Control Agency is currently conducting a comprehensive assessment of the entire levee system that provides flood protection to the City of West Sacramento. The evaluation includes problem identification for the existing levees, an alternatives analysis of various potential levee repair methods, and development of the conceptual cost estimates associated with those repairs. The levee system is being studied to identify the following types of deficiencies: freeboard, static and rapid drawdown stability, underseepage and through-seepage, seismic vulnerability.

geometry, and erosion. The WSAFCA has defined the goal for future levee upgrades to be protective against a 200-year flood event.

The overall levee improvement program also includes the identification of candidate sites for the State-Federal Flood Control System Modification Program, Early Implementation Projects. A 500-ft reach of the Sacramento River west levee was identified as a result of this process and submitted for consideration in an encroachment permit application No. 18313 to the Board.

Because this is an alteration of a federal project levee, a Section 408 approval from the U.S. Army Corps of Engineers is required.

Discussion

The I Street Bridge-South project is part of a broader flood protection assessment conducted by WSAFCA. Early results of WSAFCA's levee assessment finds that the 500-foot I Street Bridge- South reach of the west levee has seepage, geometry, stability, freeboard, and erosion problems. WSAFCA proposes to mitigate the seepage, stability, and geometry deficiencies by constructing a slurry cutoff wall and flattening the landside slope of a small portion of the reach to achieve a 3H:1V slope. Further, WSAFCA selected this project as one of the agency's early implementation projects based on a set of site selection criteria. The erosion and freeboard deficiencies will be corrected as part of a separate, future levee upgrade project.

WSAFCA's ground survey, Problem Identification Study, and site geotechnical investigation identified the deficiencies of the I Street Bridge-South site levee. With respect to the deficiencies that are being mitigated on this project, WSAFCA relied on the Geotechnical Report prepared by Kleinfelder published in a draft report dated December 2007 and HDR's draft Problem Identification Report.

The geotechnical investigation formed the basis of the selection and design of the slurry cutoff wall to mitigate the levee seepage and stability deficiencies. The geotechnical investigation describes the subsurface conditions of the project site based on the field borings drilled at the project location and to the north of I Street Bridge. It found that the levee embankment consists of poorly graded sand to silty sand. Below the levee embankment materials, a five to eight feet layer of sandy silt and lean clay blanket layer was observed. These soils were underlain by silty sand that was approximately 5 to 15 feet thick. The silty sand was underlain by a four to nine-foot layer of sandy silt and lean clay. Below these semipervious layer (blanket) is a 40-ft thick layer of sand, which is underlain by a 25-ft thick layer of gravel (Exhibit 4). Similar subsurface conditions were found to the north of I Street Bridge.

Kleinfelder performed a seepage and stability analyses to evaluate the use of soil-bentonite cutoff wall constructed from the crest of the levee. The use of other mitigation measures such as seepage berms and relief wells were not considered feasible due to project constraints.

The analyses used the subsurface conditions described above. Seepage analyses were completed using steady state analysis procedures with the modeling program SEEP/W version 6.22. Seepage quantities, including through seepage and underseepage, and exit gradients were estimated for the 1957design profile, 100-year, 200-year, and 200-year + 3 feet water surface elevations. Slope stability analyses for Rapid Drawdown case was conducted using software program UTEXAS 4 and Slope W version 6.22 was used for Steady State Seepage. The factor of safety against downstream slope failure was calculated using Spencer's method, "entry and exit" search routine and pore water pressures computed by SEEP/W.

The seepage analyses found that the exit gradients for existing conditions are within the Corps criteria of 0.5, with the highest calculated value of 0.48 on the 200-year + 3 water surface elevations. This exit gradient was reduced to 0.4 after construction of a 40-ft slurry wall. For the other water surface elevations, the exit gradients were well below the 0.5 criteria and basically remain the same with the addition of the 40-ft deep slurry cutoff wall. However, the modeling analysis shows water seeping through the sand levee. With the addition of the slurry cutoff wall extending through the levee, the through levee seepage deficiency is mitigated to an acceptable level.

The Rapid Drawdown Stability Analysis results indicate waterside slopes along the reach exhibited a calculated factor of safety greater than 1.2 for the 200-year + 3 feet water surface elevations. This factor of safety meets Corps criteria of 1.0-1.2. For the Steady State Stability case, the slope stability analysis shows a factor of safety of 1.17 which is below the Corps criterion of 1.4. With the installation of the cutoff wall, the stability analysis shows a factor of safety greater than 1.4 for the 200-year + 3 feet water surface elevations.

The HDR Administrative Draft Problem Identification Report identified approximately 50 feet of levee section on the southern most part of the project with a slope of 2.5H:1V. WSAFCA proposes to flatten this section to bring the slope to 3H:1V to meet the more stringent Corps criteria.

Staff Recommendation

Staff agrees with the proposed construction of a 40-ft bentonite slurry wall to mitigate for seepage and stability deficiencies. Staff also agrees with the proposed slope flattening to bring a section of the levee to 3H:1V slope.

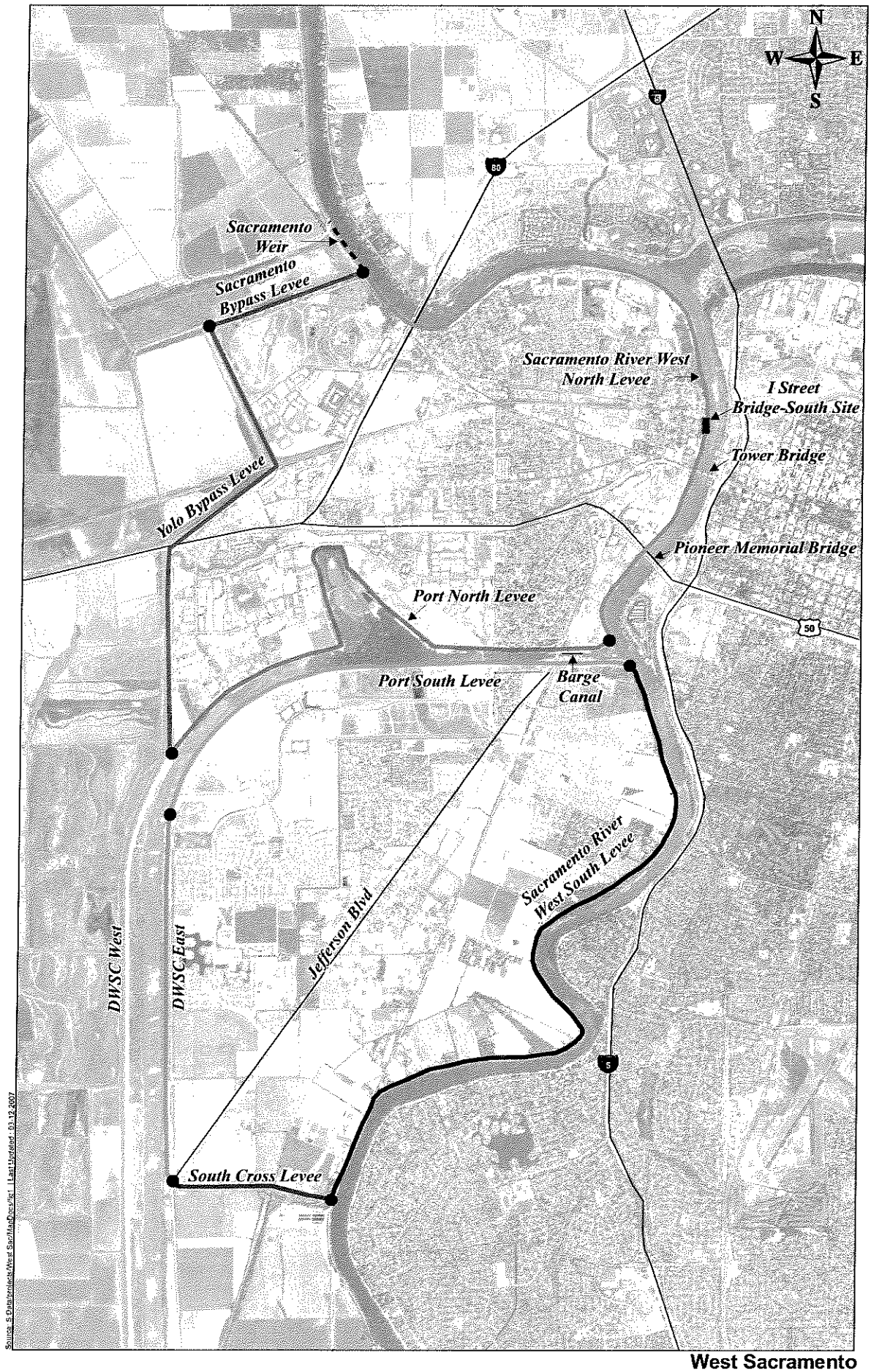
Staff recommends sending a letter to the U. S. Army Corps of Engineers requesting 33 U.S.C. Section 408 approval to alter the federal flood control project levee at the I Street Bridge- South site on the west bank levee of the Sacramento River in West Sacramento. Staff also recommends delegating to the Executive Officer the signing of the letter. A draft letter requesting 408 approval is attached (Exhibit 5). The permit application will come before the Board at a later meeting.

Attachments

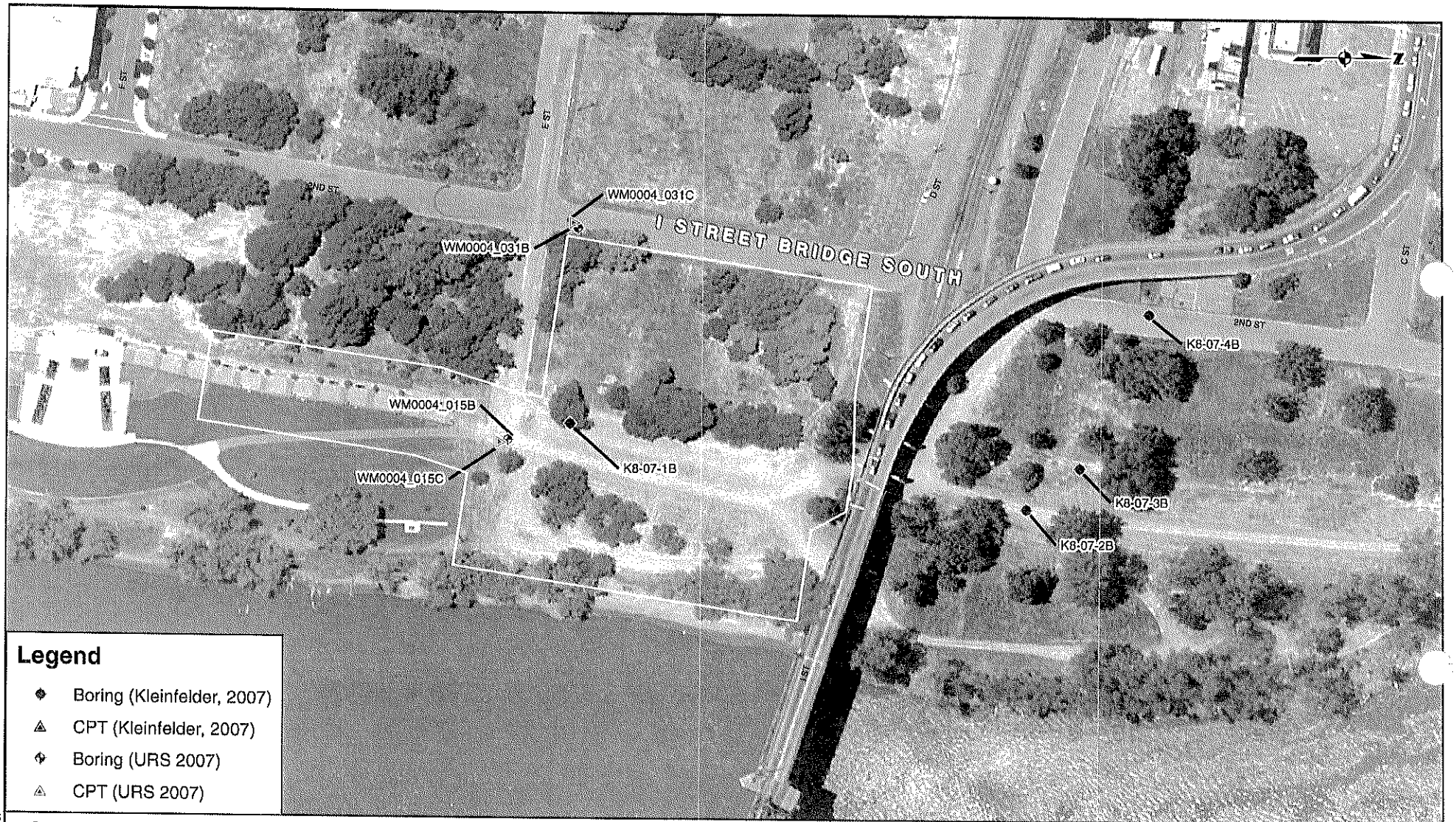
Exhibit 1 – Project Vicinity Map
Exhibit 2 - Project Location Map
Exhibit 3 – Project Plan and Profile
Exhibit 4 – Geologic Profile
Exhibit 5 - Draft 408 Letter

DSF: March 2008

EXHIBIT 1 - PROJECT VICINITY MAP



Source: S:\Data\projects\West Sac\MapDocs\Fig1 | Last Updated: 03-12-2007



Legend

- Boring (Kleinfelder, 2007)
- CPT (Kleinfelder, 2007)
- Boring (URS 2007)
- CPT (URS 2007)

0 50 100 200 Feet

1 inch equals 100 feet

1:1,200

Aerial: USGS Urban High Resolution Orthophotography, 2002

Note: Title modified by HDR, Inc. 3/10/08

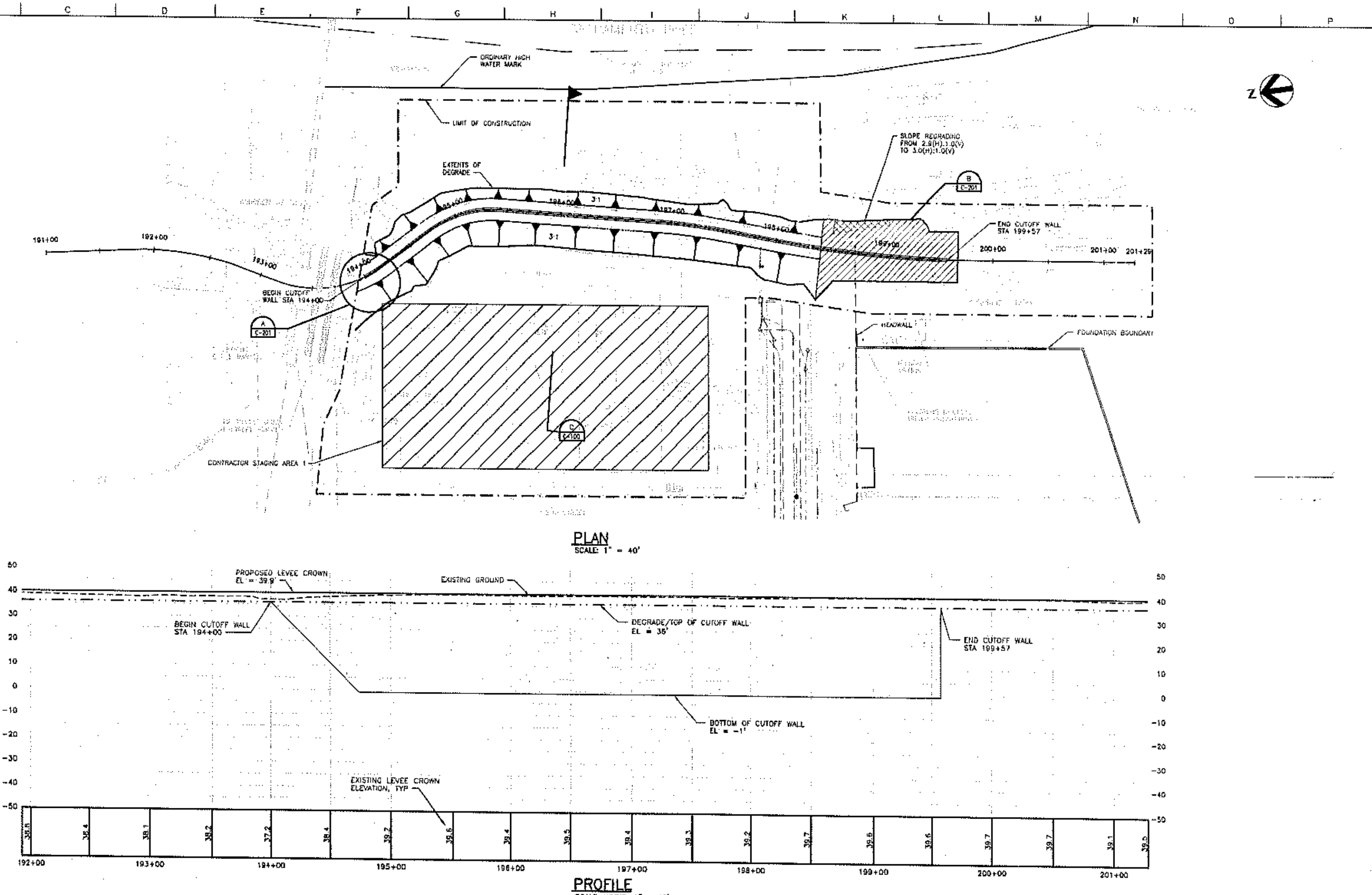
KLEINFELDER
3077 Fite Circle
Sacramento, Ca. 95827
916-366-1701
www.Kleinfelder.com

EXHIBIT 2 - PROJECT LOCATION MAP

WEST SACRAMENTO LEVEE INVESTIGATION
WEST SACRAMENTO
YOLO COUNTY, CALIFORNIA

Plate 2B

Graphic By: I.McGovern | 12/17/07 | Project Number:87394-RPT | File Name:Reach8.MXD



Issue No.	Description	Date	Drwn.	Chkd.	Resp. Engr.	Proj. Mgr.
	90% SUBMITTAL	02/08	AJ		EN	EN
	60% SUBMITTAL	11/07	AJ		EN	EN

WORK ORDER #4116

HORIZONTAL DATUM IS THE CALIFORNIA COORDINATE SYSTEM, ZONE 2 (NAD 83)
VERTICAL DATUM IS NAVD 88

HDR
HDR Engineering, Inc.

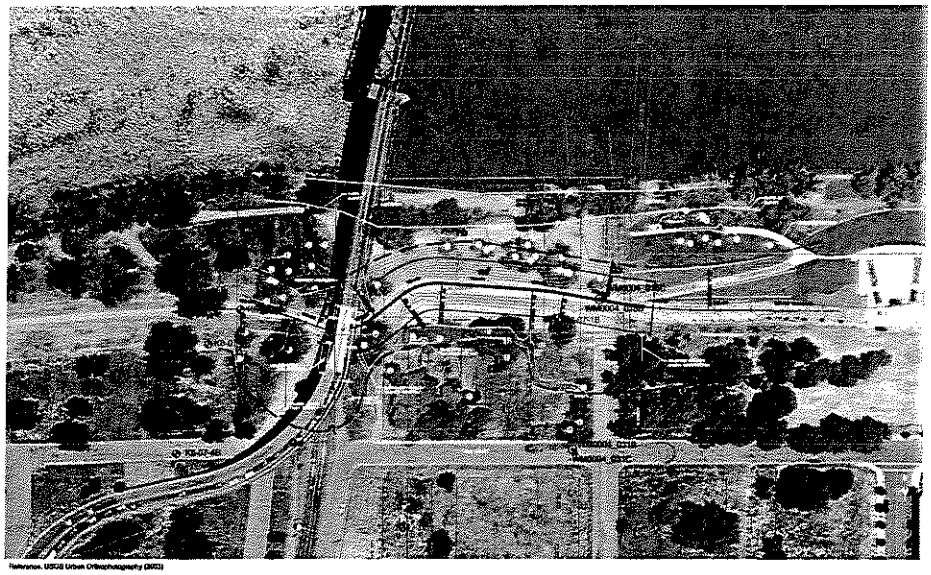
Project Manager: E. NAGY
Designed: M. VECCHIO
Drawn: A. JACKSON

City of West Sacramento
Levee Improvement Program
Early Implementation Project
I Street Bridge South Levee

PRELIMINARY
THESE PLANS ARE NOT ISSUED FOR BID OR CONSTRUCTION. THEY ARE ISSUED FOR REVIEW AND COMMENT ONLY.

EXHIBIT 3
PROJECT PLAN AND PROFILE
194+00 TO 199+57

Date: MARCH 2008
Scale: AS NOTED
Project No. 007436-68914-141
File Name: 68914-8-C200.DWG
Drawing No. C-200
Issue: X

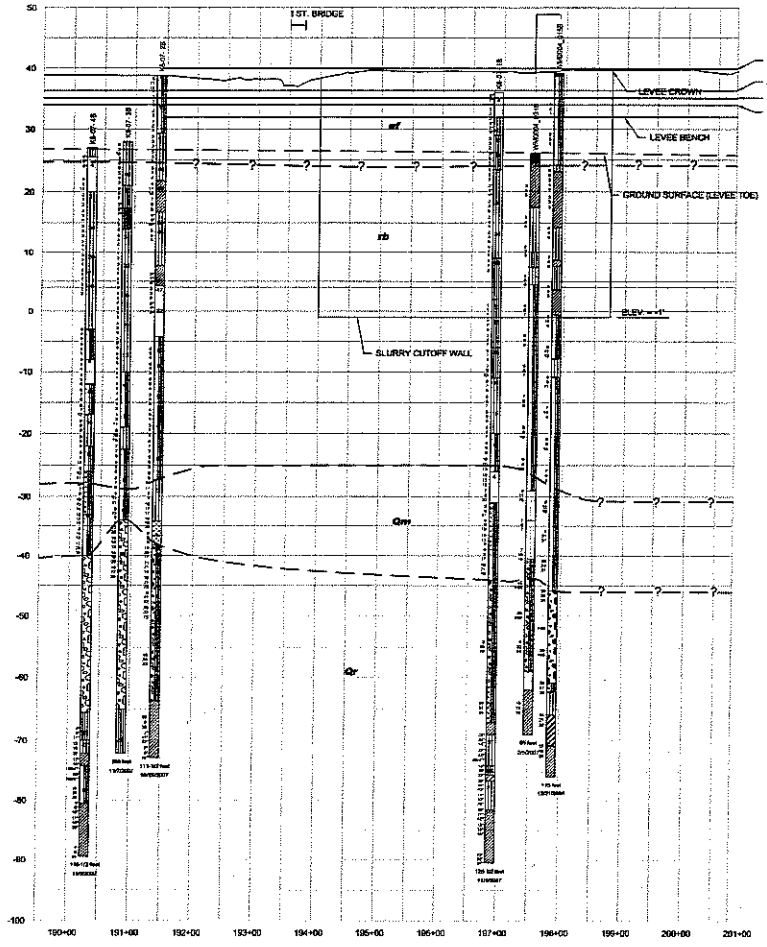


Reference: USGS Urban Orthophotography (2003)

LEGEND

- Boring Location (Kleinfelder 2007)
- Boring Location (URS 2007)
- CPT Location (URS 2007)

APPROXIMATE SCALE: 1 inch = 800



LOG LEGEND

Exploration Number

CH, Fat Clay

MH, Elastic Silt

CL, Lean Clay, Sandy Lean Clay

ML, Silt, Sandy Silt

SC, Clayey Sand

SM, Silty Sand, Silty Sand with Gravel

SP, Poorly Graded Sand, Poorly Graded Sand with Gravel

SP-SC, Poorly Graded Sand with Clay

SP-SM, Poorly Graded Sand with Silt

SW, Well Graded Sand, Well Graded Sand with Gravel

SW-SC, Well Graded Sand with Clay

SW-SM, Well Graded Sand with Silt

GC, Clayey Gravel

GM, Silty Gravel, Silty Gravel with Sand

GP, Poorly Graded Gravel, Poorly Graded Gravel with Sand

GP-GC, Poorly Graded Gravel with Clay

GP-GM, Poorly Graded Gravel with Silt

GW, Well Graded Gravel, Well Graded Gravel with Sand

GW-GC, Well Graded Gravel with Clay

GW-GM, Well Graded Gravel with Silt

Total Depth of Exploration

Date Completed

Percent fines (Material passing No. 200 sieve)

Groundwater Level (at time of drilling)

APPROXIMATE VERTICAL SCALE: 1 inch = 10

APPROXIMATE HORIZONTAL SCALE: 1 inch = 100 feet

Topography and Survey Information Provided by KSN and HDR. Elevation Reference: NAVD88.

GEOLOGIC LEGEND

—?— Geologic Contact

af Fill

rb Channel Bar Deposits - Fine gravel, sand and silt deposited in stream or along channel lateral margins

Qb Basin Deposits - Unweathered gravel, sand and silt

Qm Modesto Formation - Unconsolidated gravel, sand silt and clay

Qr Riverbank Formation - Weathered gravel, sand and silt

* THIS DRAWING MODIFIED BY HDR, INC. ON 3/10/08 TO REFLECT REVISED CUTOFF WALL BOTTOM ELEVATION CONTAINED IN 3/6/08 KLEINFELDER MEMO RE: CUTOFF WALL DEPTH.

KLEINFELDER	EXHIBIT 4 - GEOLOGICAL PROFILE REACH 6 WEST SACRAMENTO EARLY IMPLEMENTATION PROJECT I STREET BRIDGE SOUTH LEVEE WEST SACRAMENTO, CALIFORNIA		PLATE 5B
Drawn By: D. ROSS Project No.: 87364FLD	Date: 02/20/2008 Filename: 87364R-EPP		

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, GOVERNOR

THE RECLAMATION BOARD
3310 El Camino Ave., Rm. LL40
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-0653 FAX: (916) 574-0682

Exhibit 5

Colonel Thomas C. Chapman, District Engineer
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814

Dear Colonel Chapman:

Based on the Policy and Procedural Guidance for the Approval of Modification and Alteration of Corps of Engineers Projects dated October 23, 2006, and on behalf of West Sacramento Area Flood Control Agency (WSAFCA), the Central Valley Flood Protection Board (Board) is requesting permission from the U.S. Army Corps of Engineers (Corps) to alter a portion of the Sacramento River Flood Control Project (SRFCP). The Board is making this request pursuant to 33 U.S.C. Section 408.

The Board has reviewed the project plans and drawings, the geotechnical report, hydraulic analysis, and other reports submitted by WSAFCA in support of its proposed work associated with the West Sacramento Levee Improvement Early Implementation Project, I Street Bridge- South site project. The proposed work includes construction of approximately 475 feet of slurry wall and approximately 50 feet of landward slope flattening to achieve 3H:1V slope on the west (right) bank levee of the Sacramento River. The Board has determined that WSAFCA will accomplish this alteration in a manner that will not be injurious to the public interest and will not impair the usefulness of the SRFCP. Attached is the information you required to accompany this request as outlined in your October 23, 2006 policy and procedural guidance.

If the Corps approves this request the Board will consider authorizing the proposed work by way of its permit process. If the proposed project, upon completion, is formally incorporated within the federal SRFCP by the Corps, the State of California, acting through the Board, will accept the altered project for operation and maintenance and hold and save the United States free from damage due to the constructed works.

Within 180 days of completion of the project alteration, the Board will provide both information to the Corps for the purposes of preparing a revised Operation and Maintenance Manual for this portion of the SRFCP, and as-built Plans and Specifications for the alteration.

In order to achieve the flood control benefits of this work for the 2008-2009 flood season, the Board is requesting that the Corps make any necessary determination so that WSAFCA may proceed with this alteration by July 2008.

If you have any questions, please feel free to contact me at (916) 574-0609, or your staff may contact Dan S. Fua, Staff Engineer of the Board, at (916) 574-0698.

Sincerely,

_____

Jay S. Punia, Executive Officer
Central Valley Flood Protection Board

Attachments

cc: Mr. Ken Ruzich, General Manager
West Sacramento Flood Control Agency
1420 Merkley Way, Office #4
West Sacramento, California 95691

Mr. Ric Reinhardt, P. E.
MBK Engineers
2450 Alhambra Boulevard, 2nd Floor
Sacramento, California 95817